Trend Study 22-3-03

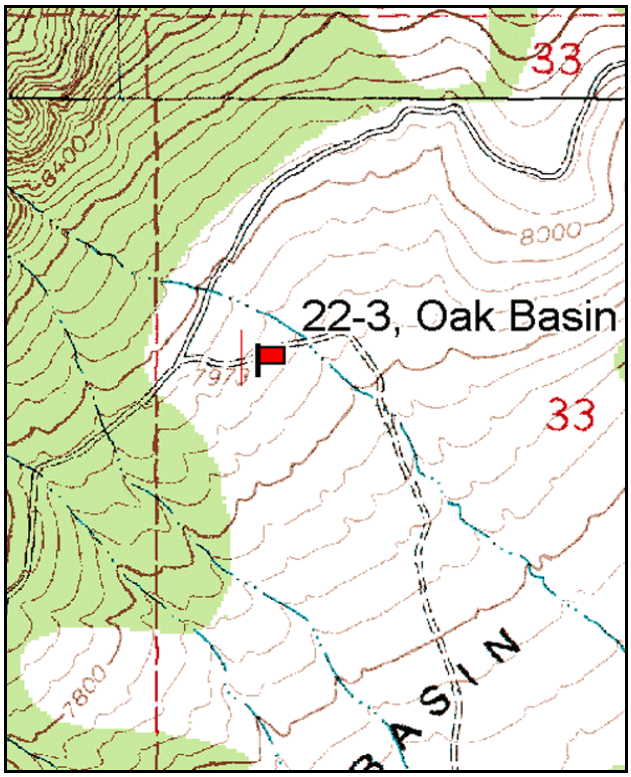
Study site name: Oak Basin . Vegetation type: Oak-Sagebrush .

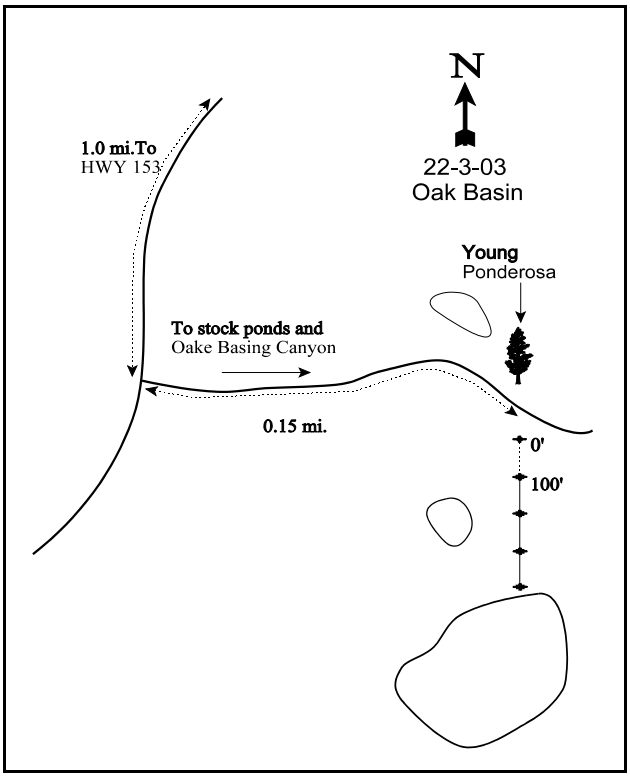
Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 2 on 3ft, belt 5 on 7ft.

LOCATION DESCRIPTION

From the center of Junction in Piute County, go west on Highway 153 for 7.6 miles. Take the left fork (Oak Basin Cottonwood or Rd 134) and go just under 1 mile to another fork. Turn left and go 0.15 miles to a lone ponderosa pine 15 feet to the left of the road. The baseline starts 100 feet south of the pine. The 0-foot stake is a steel rebar tagged #7044.




Map Name: Circleville

Diagrammatic Sketch

Township 29S , Range 4W , Section 33

GPS: NAD 27, UTM 12S 4233609 N, 384257 E

## DISCUSSION

### Oak Basin - Trend Study No. 22-3

This transect is located in Oak Basin approximately 5½ miles west of Junction. The site is moderately steep (20%) and drains to the southeast at an elevation of 7,900 feet. The study is part of a 600-acre tract that was dixie harrowed and seeded in 1965. The site also burned between the 1985 and 1991 surveys. Deer use the area as spring-fall range and during mild winters. The area is grazed as part of the Circleville Cattle Allotment on a 3 year rest rotation system. In the first year, cattle graze the area from June 1 to July 24. In the second year, cattle graze from July 24 through October 15. The pasture is then rested in the third year. The DWR Oak Basin pellet group transect is located 200 to 300 feet higher in elevation and about ½ mile to the north. Deer days use/acre rose from 13 (32 ddu/ha) in 1976-77 to 42 (104 ddu/ha) in 1984-85 with 5-year averages of 16 deer days (40 ddu/ha) between 1976 and 1981 and 75 deer days (185 ddu/ha) between 1981 and 1985 (Jense et al. 1985). The trend for deer days use/acre appeared stable from 1985-86 through 1991-92 with an average of 28 (69 ddu/ha) (Jense et al. 1991). Pellet group data was not collected in 1992-93, but beginning in 1993-94, there was an obvious decline in use patterns with average days use/acre dropping to an average of 4 (10 ddu/ha) between 1993-94 through 1996-97 (Evans et al. 1997). A pellet group transect read on the site in 1998 estimated 39 deer days use/acre (96 ddu/ha). Data from 2003 estimated 46 deer days use/acre (114 ddu/ha). Cattle use was estimated at 75 cow days use/acre (185 cdu/ha) in 1998 and 25 cow days use/acre (63 cdu/ha) in 2003. Cattle were grazing the site when it was read in July of 2003. A few elk pellet groups were also sampled in 2003. Jackrabbits, cottontail rabbits, sage grouse, and blue grouse are also found nearby.

Soils are sandy clay loam in texture with a slightly acidic pH (6.3). Soil depth is fairly shallow as the effective rooting depth is estimated at less than 9 inches. Average soil temperature was 61.2°F at 12 inches in 1998 and 74°F in 2003. The difference in temperature between years is a function of soil moisture. Higher soil temperatures indicate a drier profile which is not surprising as the 2003 survey occurred during drought. Parent material is metamorphic rock originating from the cliffs west of the transect. Initially, bare soil was low at 6%, but has increased to 26% in 2003. Conversely, percent litter cover has steadily declined with each reading ranging from 67% in 1985 to 32% in 2003. In 1998, no signs of erosion were noted and the soil appeared to be building. In 2003, an erosion condition class assessment rated soils as stable. Many of the changes in basic cover categories were brought about by the fire that burned through the site prior to the 1991 reading.

Mountain big sagebrush is the key browse species on the site. In 1985, the age structure of this species indicated a maturing population as seedlings and young plants accounted for 1% and 10% of the population respectively. All plants were vigorous and hedging was light to moderate depending on the ecotypic variation of individual plants. Due to a fire that burned through the site between 1985 and 1991, there were no mountain big sagebrush plants encountered in the density plots in 1991. The population has since returned with an estimated density of 1,240 plants/acre in 1998 and 2003. In 1998, young plants were abundant as they made up 26% of the population. With drier conditions in 2003, young sagebrush represented only 10% of the population yet are abundant enough to replace those individuals classified as decadent and dying. Vigor has been mostly normal in all readings. Sagebrush had abundant seedhead production in 2003 and annual leader growth averaged just under 2 inches.

Antelope bitterbrush and Gambel oak are also important on this site. The bitterbrush is scattered throughout the site with an estimated density of 120 plants/acre in 1998 and 2003. Bitterbrush plants are short statured due to many years of heavy browsing, but the population is generally healthy and vigorous. The Gambel oak population was drastically reduced following the burn. Pre-burn estimates were nearly 16,000 stems/acre for oak, while density was estimated at 520 stems/acre in 1998 and 960 in 2003 following the burn. The majority of the oak sampled in 1998 were classified as young (62%), but nearly the entire population was classified as

mature in 2003 (96%). Oak has been healthy and vigorous in all readings. It has been rated as only lightly hedged in all years except 1998 when use was classified as more moderate. The remainder of the browse species are relatively unimportant in terms of total production, but add diversity and offer variety to the deer diet.

The herbaceous understory is dominated by perennial grasses. Ten grasses were encountered on the site in 1998 and 12 in 2003. Intermediate wheatgrass is by far the dominant species as it provided nearly 80% of the total grass cover in 1998 and 2003. It also provided over one-half of the total vegetation cover for the site in both years. This species has maintained a fairly constant nested frequency value in all years, both pre and post-burn samples included. Crested wheatgrass is second to intermediate wheatgrass in abundance. Crested wheatgrass has significantly declined on the site since 1985, yet was still sampled in almost one-half of the quadrats in 2003. The only native perennial grass to be fairly abundant is mutton bluegrass. This species is found primarily under the protection of shrubs and where intermediate wheatgrass is less abundant. Utilization on grasses was moderate at the time of sampling in 1998, but somewhat lighter in 2003. In 1998, the grasses under the canopy of browse plants received the lightest use, while those in the interspaces were generally clipped to within a few inches of the ground. Perennial grass sum of nested frequency has declined over all years.

The forb component is poor for a site at this high of an elevation. Silvery lupine has been the most abundant forb species in all samples, although it significantly declined in nested frequency between 1998 and 2003 due to drier conditions. Most other species are sparse in the area. Use of these forbs by cattle is light. However the forbs, especially the lupine, are unquestionably important in the spring and summer diet for deer. A highly competitive perennial grass component, primarily seeded exotics, will make it difficult for most forbs to increase in the future.

1985 APPARENT TREND ASSESSMENT

The soil is well protected and building, with no indication of erosion problems. Vegetative trend was influenced by the seeding project in 1965. Species diversity is good and there is a healthy balance between the grass, forb, and shrub components. With the exception of spreading patches of Gambel oak, the community appears stable at present. In the long-term, the browse species can be expected to slowly decline unless reproduction increases.

1991 TREND ASSESSMENT

Because of a recent wildfire, the soil trend has changed dramatically since 1985. Percent bare ground has increased from 6% to 18% and percent litter has decreased substantially. Trend is down and should be monitored closely. Browse trend is obviously down with the loss of all browse except for Gambel oak and pricklypear cactus to the fire. The herbaceous understory trend is slightly downward. Of the 29 species encountered, 14 show downward trends. Even with crested wheatgrass and intermediate wheatgrass with quadrat frequencies of 67% and 99% respectively, the overall trend with the effects of long-term drought and a relatively recent fire is slightly down.

TREND ASSESSMENT
soil - down (1)
browse - down (1)
herbaceous understory - slightly down (2)

1998 TREND ASSESSMENT

The soil trend is slightly upward with a decrease in percent bare ground cover. There currently appears to be

adequate vegetation and litter cover to protect the soil from accelerated erosion. Percent rock and litter cover have stayed relatively stable over all years. The browse trend is upward with the recovery of mountain big sagebrush after the fire. The population appears healthy with young plants making up 26% of the population. Utilization is light to moderate with percent decadence at 15%. The herbaceous understory trend is again slightly down. As a group, sum of nested frequency for perennial grasses and forbs continues to decline. However, intermediate wheatgrass and crested wheatgrass are the most abundant herbaceous species and both have slightly increased nested frequency values in 1998.

TREND ASSESSMENT
soil - slightly up (4)
browse - up (5)
herbaceous understory - slightly down (2)

2003 TREND ASSESSMENT

Trend for soil is down. Drought conditions have resulted in an increase in bare soil and large decreases in both vegetation and litter cover. Average cover and nested frequency of herbaceous perennials both show declines in 2003 as well. Soils do not show evidence of accelerated erosion at the present time. Trend for browse is stable. The key species, mountain big sagebrush, has a stable density and normal vigor throughout most of the population. Percent decadence slightly increased and recruitment by young plants declined. However, the current level for both of these parameters are acceptable with the dry conditions in 2003. Bitterbrush also has a stable density, while Gambel oak is increasing on the site. Trend for the herbaceous understory is down. Intermediate wheatgrass, the dominate grass on the site, maintained a stable nested frequency value in 2003. Crested wheatgrass significantly declined as did *Carex*. The only abundant perennial forb, silvery lupine, also significantly declined in frequency and cover in 2003. Overall, average cover of herbaceous perennials declined by 1/3, and sum of nested frequency decreased by over 20%. The dry conditions in 2003 played a definitive role in the decline of herbaceous species.

TREND ASSESSMENT
soil - down (1)
browse - stable (3)
herbaceous understory - down (1)

HERBACEOUS TRENDS --
Management unit 22 , Study no: 3

| Type | Species | Nested Frequency | | | | Average Cover % | |
|---|---|---|---|---|---|---|---|
| | | '85 | '91 | '98 | '03 | '98 | '03 |
| G | Agropyron cristatum | $_{c}$221 | $_{b}$169 | $_{bc}$176 | $_{a}$101 | 4.73 | 2.94 |
| G | Agropyron intermedium | $_{ab}$316 | $_{a}$303 | $_{b}$326 | $_{ab}$319 | 20.23 | 15.73 |
| G | Agropyron spicatum | - | - | - | 3 | - | .00 |
| G | Agropyron trachycaulum | - | 4 | - | - | - | - |
| G | Bouteloua gracilis | 4 | 2 | 1 | 8 | .03 | .44 |
| G | Bromus inermis | $_{b}$16 | $_{a}$- | $_{ab}$12 | $_{ab}$5 | .16 | .07 |
| G | Carex spp. | $_{b}$34 | $_{b}$24 | $_{b}$26 | $_{a}$1 | .55 | .03 |
| G | Elymus junceus | $_{b}$10 | $_{a}$- | $_{a}$- | $_{a}$- | - | - |

| Type | Species | Nested Frequency | | | | Average Cover % | |
|---|---|---|---|---|---|---|---|
| | | '85 | '91 | '98 | '03 | '98 | '03 |
| G | Koeleria cristata | 1 | 3 | - | 3 | - | .03 |
| G | Oryzopsis hymenoides | - | - | 3 | - | .00 | - |
| G | Poa fendleriana | $_{b}$127 | $_{b}$102 | $_{a}$28 | $_{a}$43 | .33 | .41 |
| G | Poa pratensis | 8 | - | 3 | 5 | .00 | .03 |
| G | Poa secunda | - | - | - | 2 | - | .00 |
| G | Sitanion hystrix | 1 | 1 | 2 | - | .00 | - |
| G | Stipa comata | 3 | 7 | - | 1 | - | .00 |
| G | Stipa lettermani | $_{ab}$19 | $_{b}$31 | $_{ab}$24 | $_{a}$8 | .46 | .21 |
| Total for Annual Grasses | | 0 | 0 | 0 | 0 | 0 | 0 |
| Total for Perennial Grasses | | 760 | 646 | 601 | 499 | 26.53 | 19.93 |
| Total for Grasses | | 760 | 646 | 601 | 499 | 26.53 | 19.93 |
| F | Agoseris glauca | $_{a}$- | $_{b}$13 | $_{ab}$9 | $_{a}$- | .01 | - |
| F | Arabis spp. | $_{a}$- | $_{b}$16 | $_{a}$- | $_{a}$1 | - | .03 |
| F | Astragalus convallarius | $_{ab}$6 | $_{b}$7 | $_{a}$- | $_{b}$7 | - | .02 |
| F | Astragalus spp. | 4 | - | 6 | 3 | .16 | .06 |
| F | Castilleja chromosa | $_{b}$10 | $_{b}$14 | $_{a}$- | $_{a}$- | - | - |
| F | Calochortus nuttallii | $_{ab}$2 | $_{b}$9 | $_{ab}$3 | $_{a}$- | .00 | - |
| F | Chenopodium album (a) | - | 8 | - | - | - | - |
| F | Cryptantha spp. | 5 | - | - | 2 | - | .00 |
| F | Eriogonum racemosum | 5 | 6 | 2 | 1 | .03 | .00 |
| F | Hackelia patens | - | 2 | 2 | - | .00 | - |
| F | Lactuca serriola | - | - | 4 | - | .01 | - |
| F | Lithospermum ruderale | - | - | - | 4 | - | .00 |
| F | Lomatium spp. | - | 2 | - | - | - | - |
| F | Lotus utahensis | $_{b}$12 | $_{a}$4 | $_{a}$- | $_{a}$- | - | - |
| F | Lupinus argenteus | $_{ab}$45 | $_{bc}$50 | $_{c}$70 | $_{a}$29 | 7.11 | 2.34 |
| F | Medicago sativa | 4 | 1 | 4 | 3 | .06 | .00 |
| F | Microsteris gracilis (a) | - | - | $_{a}$- | $_{b}$21 | - | .14 |
| F | Phlox longifolia | $_{a}$12 | $_{b}$33 | $_{a}$3 | $_{a}$3 | .01 | .00 |
| F | Polygonum douglasii (a) | - | - | $_{b}$47 | $_{a}$- | .16 | - |
| F | Zigadenus paniculatus | 8 | 6 | - | 7 | - | .01 |
| Total for Annual Forbs | | 0 | 8 | 47 | 21 | 0.15 | 0.14 |
| Total for Perennial Forbs | | 113 | 163 | 103 | 60 | 7.41 | 2.50 |
| Total for Forbs | | 113 | 171 | 150 | 81 | 7.57 | 2.64 |

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 22 , Study no: 3

| Type | Species | Strip Frequency '98 | Strip Frequency '03 | Average Cover % '98 | Average Cover % '03 |
|---|---|---|---|---|---|
| B | Artemisia tridentata vaseyana | 41 | 40 | 3.79 | 4.25 |
| B | Cercocarpus ledifolius | 0 | 1 | .15 | - |
| B | Chrysothamnus depressus | 0 | 0 | - | .03 |
| B | Chrysothamnus nauseosus hololeucus | 0 | 1 | - | - |
| B | Chrysothamnus viscidiflorus | 1 | 1 | - | - |
| B | Juniperus osteosperma | 2 | 1 | .85 | .98 |
| B | Opuntia spp. | 6 | 3 | .36 | .21 |
| B | Purshia tridentata | 6 | 5 | .18 | .91 |
| B | Quercus gambelii | 7 | 6 | .21 | .30 |
| Total for Browse | | 63 | 58 | 5.54 | 6.68 |

CANOPY COVER, LINE INTERCEPT --
Management unit 22 , Study no: 3

| Species | Percent Cover '03 |
|---|---|
| Artemisia tridentata vaseyana | 7.33 |
| Chrysothamnus depressus | .08 |
| Juniperus osteosperma | 1.39 |
| Opuntia spp. | .20 |
| Purshia tridentata | .38 |
| Quercus gambelii | 1.21 |

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 22 , Study no: 3

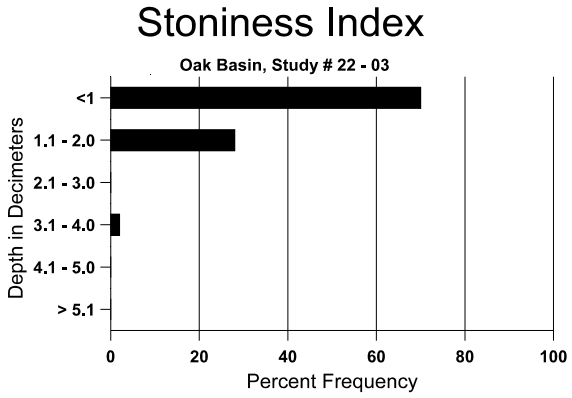
| Species | Average leader growth (in) '03 |
|---|---|
| Artemisia tridentata vaseyana | 1.9 |
| Purshia tridentata | 2.4 |

BASIC COVER --
Management unit 22 , Study no: 3

| Cover Type | Average Cover % | | | |
|---|---|---|---|---|
| | '85 | '91 | '98 | '03 |
| Vegetation | 7.50 | 7.25 | 46.47 | 30.70 |
| Rock | 17.75 | 20.25 | 19.61 | 23.41 |
| Pavement | 2.00 | 1.00 | 1.47 | 1.69 |
| Litter | 66.50 | 53.75 | 48.23 | 31.67 |
| Cryptogams | 0 | .25 | .05 | .00 |
| Bare Ground | 6.25 | 17.50 | 9.83 | 26.11 |

SOIL ANALYSIS DATA --
Management unit 22, Study no: 3, Study Name: Oak Basin

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | ds/m |
|---|---|---|---|---|---|---|---|---|---|
| 8.5 | 74.0 (10.1) | 6.3 | 70.0 | 9.4 | 20.6 | 3.9 | 16.2 | 332.8 | 0.9 |




PELLET GROUP DATA --
Management unit 22 , Study no: 3

| Type | Quadrat Frequency | |
|---|---|---|
| | '98 | '03 |
| Rabbit | 5 | 7 |
| Elk | 1 | - |
| Deer | 25 | 16 |
| Cattle | 17 | 6 |

| Days use per acre (ha) | |
|---|---|
| '98 | '03 |
| - | - |
| - | 3 (7) |
| 39 (96) | 46 (114) |
| 75 (185) | 25 (63) |

BROWSE CHARACTERISTICS --
Management unit 22 , Study no: 3

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % poor vigor | Average Height Crown (in) |
| Artemisia nova | | | | | | | | | | | |
| 85 | **66** | - | - | - | 66 | - | 100 | 0 | 100 | 0 | -/- |
| 91 | **0** | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 98 | **0** | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 03 | **0** | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| Artemisia tridentata vaseyana | | | | | | | | | | | |
| 85 | **5265** | 66 | 533 | 2866 | 1866 | - | 38 | 15 | 35 | 0 | 20/19 |
| 91 | **0** | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 98 | **1240** | 20 | 320 | 740 | 180 | 300 | 31 | 0 | 15 | 3 | 21/26 |
| 03 | **1240** | - | 120 | 840 | 280 | 220 | 24 | 11 | 23 | 2 | 26/30 |
| Cercocarpus ledifolius | | | | | | | | | | | |
| 85 | **200** | - | 200 | - | - | - | 0 | 0 | - | 0 | -/- |
| 91 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 03 | **20** | - | - | 20 | - | 20 | 0 | 100 | - | 0 | 23/22 |
| Chrysothamnus depressus | | | | | | | | | | | |
| 85 | **66** | - | - | 66 | - | - | 0 | 0 | - | 0 | 6/6 |
| 91 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 03 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | 7/13 |
| Chrysothamnus nauseosus hololeucus | | | | | | | | | | | |
| 85 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 91 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 03 | **20** | - | - | 20 | - | - | 0 | 100 | - | 0 | -/- |
| Chrysothamnus viscidiflorus | | | | | | | | | | | |
| 85 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 91 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | **20** | - | - | 20 | - | - | 0 | 0 | - | 0 | 6/10 |
| 03 | **20** | - | - | 20 | - | - | 0 | 0 | - | 0 | 9/10 |
| Juniperus osteosperma | | | | | | | | | | | |
| 85 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 91 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | **40** | - | - | 40 | - | - | 0 | 0 | - | 0 | -/- |
| 03 | **20** | - | - | 20 | - | - | 0 | 0 | - | 0 | -/- |

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % poor vigor | Average Height Crown (in) |
| Opuntia spp. | | | | | | | | | | | |
| 85 | **66** | - | 66 | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 91 | **66** | - | - | 66 | - | - | 0 | 0 | 0 | 100 | 9/16 |
| 98 | **140** | 20 | - | 120 | 20 | - | 0 | 0 | 14 | 0 | 7/12 |
| 03 | **120** | - | - | 120 | - | - | 0 | 0 | 0 | 0 | 5/11 |
| Purshia tridentata | | | | | | | | | | | |
| 85 | **465** | - | 66 | 333 | 66 | - | 71 | 29 | 14 | 0 | 18/20 |
| 91 | **0** | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 98 | **120** | - | - | 120 | - | - | 0 | 100 | 0 | 0 | 11/26 |
| 03 | **120** | - | - | 100 | 20 | - | 0 | 100 | 17 | 17 | 11/30 |
| Quercus gambelii | | | | | | | | | | | |
| 85 | **15799** | 2266 | 13333 | 2000 | 466 | - | 5 | 0 | 3 | 2 | 33/14 |
| 91 | **9066** | 5733 | 9066 | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 98 | **520** | 20 | 320 | 200 | - | 20 | 42 | 0 | 0 | 0 | 24/24 |
| 03 | **960** | - | 40 | 920 | - | 60 | 0 | 0 | 0 | 0 | 27/23 |